Monitoring and prediction of land use land cover changes in a hotspot mining landscape in Ghana

Other

MONITORING AND PREDICTION OF LAND USE LAND COVER CHANGES IN A HOTSPOT MINING LANDSCAPE IN GHANA.

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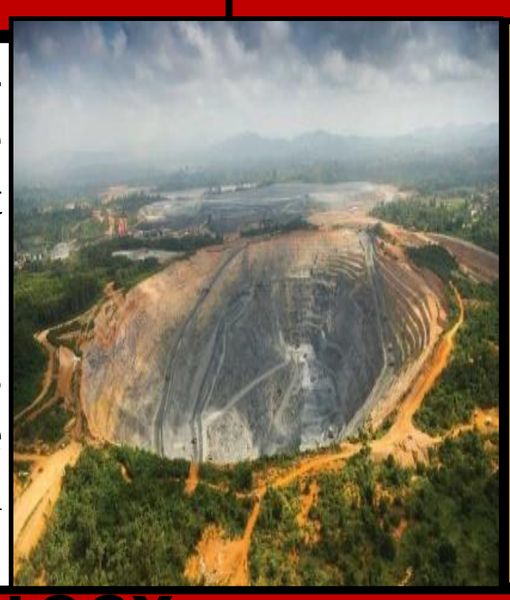
INTRODUCTION

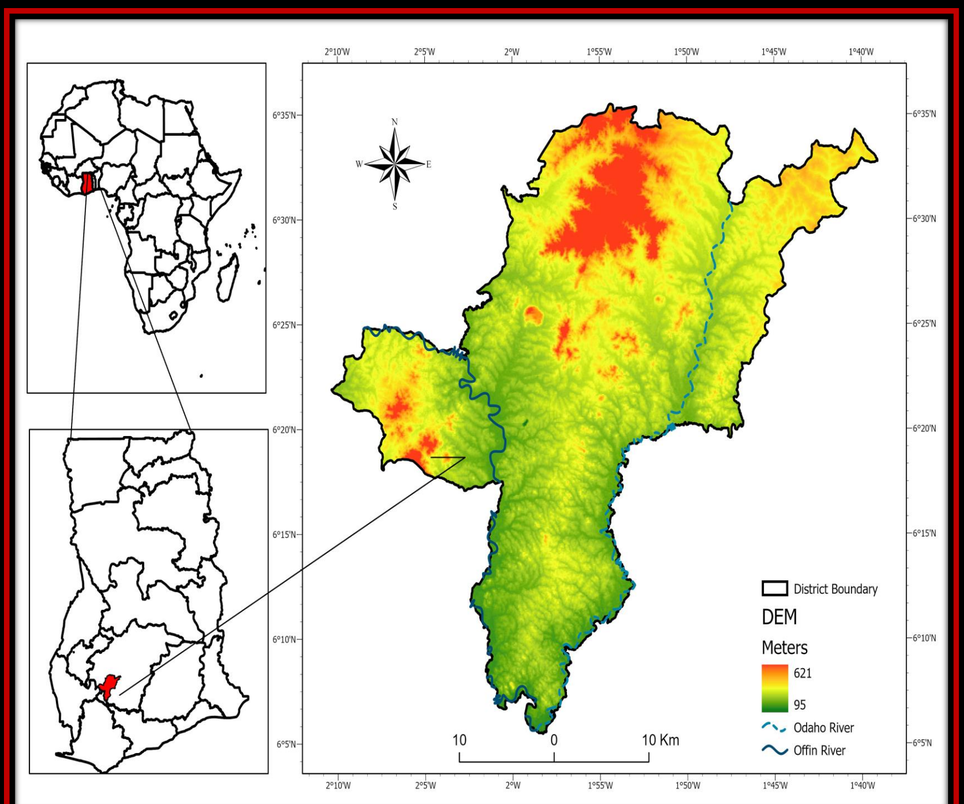
Small-scale mining operations in Ghana

- The operations of both large and small-scale mining impacts on existing land use and land cover (LULC) and poses great threat to humans and their environment
- Analysis of the historical trends and rates of current and future LULC changes are crucial in the sustainable planning and management of natural resources.

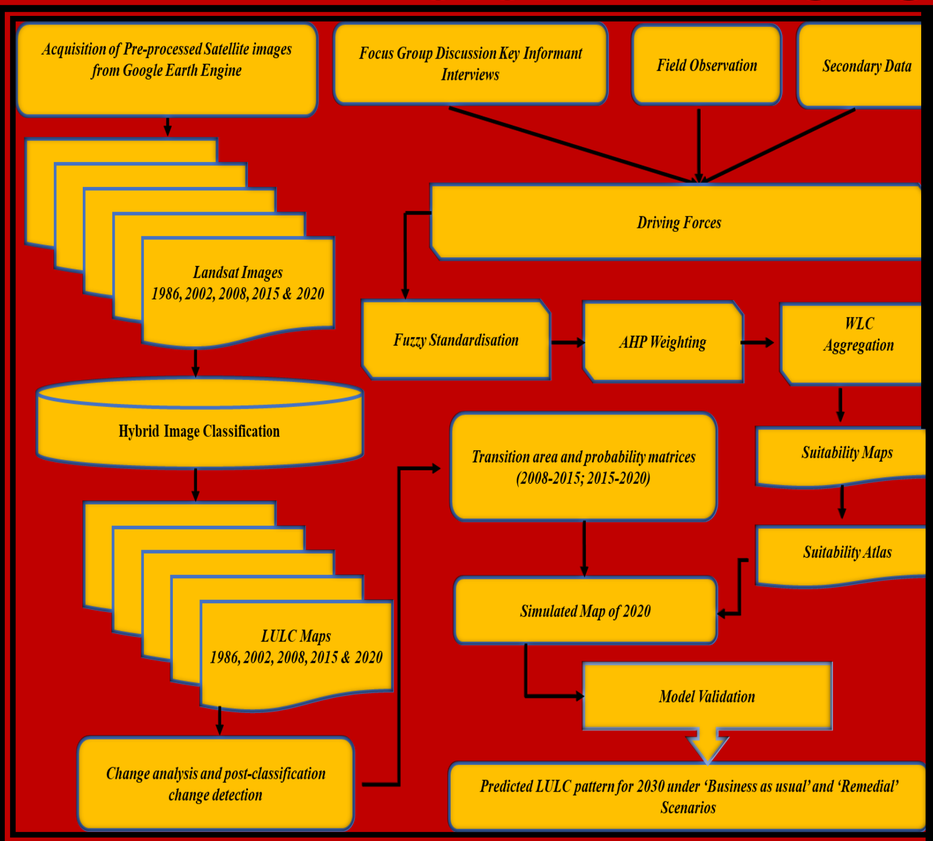


Large-scale mining operation in Ghana

GEOGRAPHICAL CONTEXT



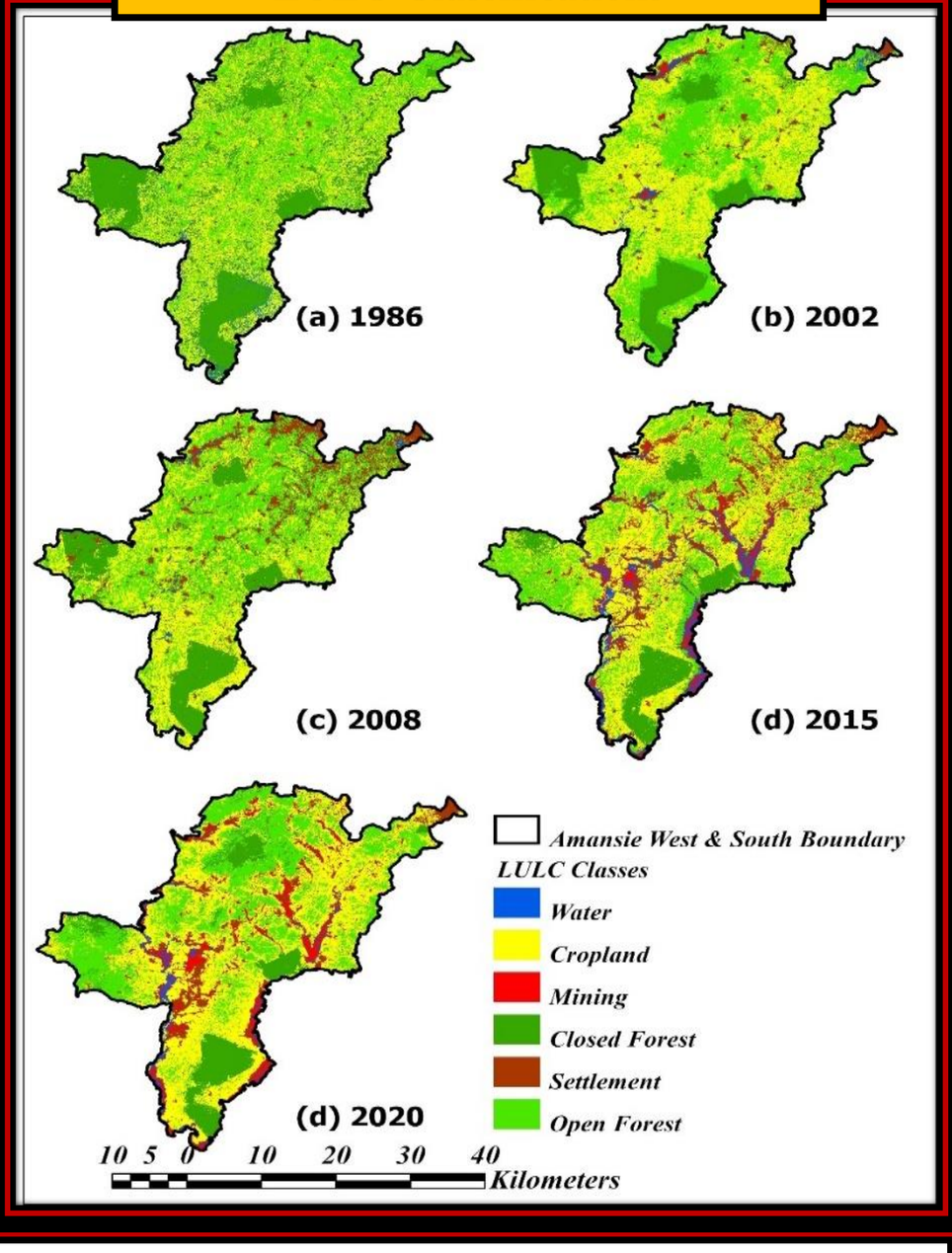
STUDY METHODOLOGY



Participant Observations/Interactions

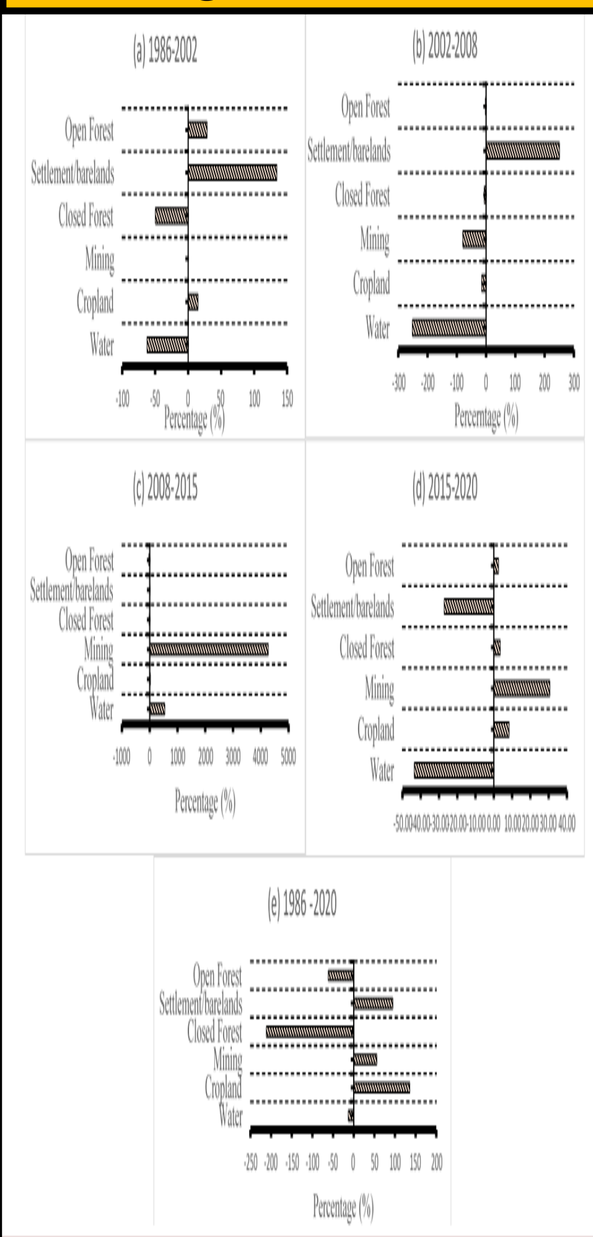
RESULTS

LULC Classifications



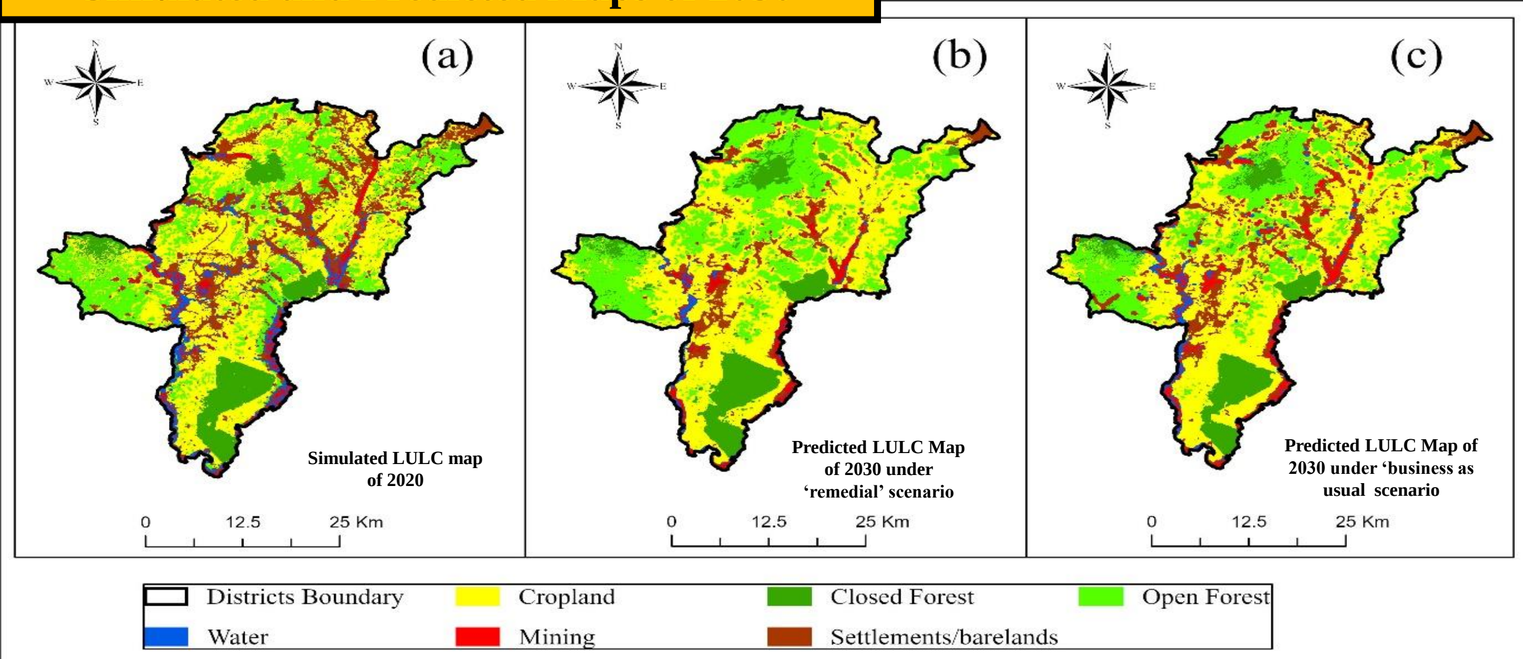
- Four unique epochs of LULC dynamics in relation to mining:
  - Invisible mining footprints (1986 map);
  - Visible mining footprints (2002 map);
  - Radical mining footprints (2008 & 2015 maps), and
  - Contracted mining footprints (2020 map)
- The net area of change in mining from 1986 to 2020 was an increase of 5,589 ha
- A total forest cover lost of 27,333ha (36%) at an average annual deforestation rate of 1.07% from 1986 to 2020
- Increased cropland of 13,593 ha from 1986 to 2020 in favour of perennial cash crops such cocoa and palm plantations

% Changes in LULC Classes



- Projected increase in mining (599 ha) and water (1,409 ha), and a decrease in croplands (1,549 ha) and closed forests (712 ha) in 2030 under the Business as usual scenario.
- Projected decline in water (1,019 ha) and mining (663ha), and increases (1,162 ha) in open forests and closed forests (1,990 ha)

Simulated and Predicted Maps of 2030



CONCLUSIONS

- Mining is intricately related to all the LULC classes, and significantly drives the observed LULC changes
- The CA-Markov model successfully predicted the future LULC changes under 'business as usual' and 'remedial' scenarios.
- The integration of remote sensing/GIS and ethnographic methods in understanding LULC changes offer elaborate and robust insights into LULC dynamics compared to using either RS/GIS or ethnographic approaches